CLAIMS

What is claimed is:

1   1. In a computerized device, a method for distributing content in a content distribution
2   network, comprising the steps of:
3   sending a multicast message to a plurality of content engine receivers, the
4   multicast message including content to be distributed among the plurality of content
5   engine receivers;
6   waiting a predetermined period for a negative acknowledgment message from at
7   least one of the plurality of content engine receivers; and
8   if a negative acknowledgment message from at least one of the plurality of
9   content engine receivers is received before expiration of a predetermined period, then
10   resending the multicast message a predetermined number of times.

1   2. The method of claim 1 further comprising the steps of:
2   receiving a second negative acknowledgment message from one of the plurality of
3   content engine receivers after resending the multicast message the predetermined
4   number of times; and
5   sending a unicast message of content to be distributed in response to the second
6   negative acknowledgment message to the one content engine receiver.

1   3. The method of claim 1 further comprising the steps of:
2   receiving a negative acknowledgment message from one of the plurality of content
3   engine receivers after the predetermined period has expired; and
4   sending a unicast message of content to be distributed to the one content engine
5   receiver in response to the negative acknowledgment message received after the
6   predetermined period has expired.

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4. The method of claim 1 wherein the step of sending further comprises the step of sending the multicast message in response to a negative acknowledgment message from at least one of the plurality of content engine receivers.

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5. The method of claim 4 wherein the step of sending further comprises the steps of:
        contacting a primary content engine sender before sending the multicast message;
        sending the multicast message to the plurality of content engine receivers if the primary content engine does not respond to the contacting; and
        disregarding the negative acknowledgment if the primary content engine does respond to the contacting.

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6. The method of claim 1 wherein the negative acknowledgment includes a request for at least one file not received in the multicast message, and wherein the step of resending the multicast message further comprises resending only the at least one file requested in the negative acknowledgment.

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7. The method of claim 6 wherein a plurality of negative acknowledgments are received during the predetermined period, each negative acknowledgment including a request for at least one file not received in the multicast message, and wherein the step of resending the multicast message further comprises the steps of:
    aggregating the files requested in the plurality of negative acknowledgments; and
        resending the multicast message including the aggregated files.

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8. The method of claim 1 wherein the multicast message includes a plurality of files, each file of the plurality having an associated count value, the associated count value indicating the number of times the file has been transmitted by the computerized device, the method further comprising the step of incrementing the associated count value each time the computerized device transmits a file.

1   9. The method of claim 8 wherein the negative acknowledgment includes a request for at

2   least one file not received in the multicast message, and wherein the step of resending the

3   multicast message further comprises resending the at least one file until the associated

4   count for the at least one file equals the predetermined number.

1   10. In a computerized device, a method for distributing content in a content distribution

2   network, comprising the steps of:

3   receiving a negative acknowledgment message from one of a plurality of content

4   engine receivers;

5   checking a primary content engine sender for status;

6   if the primary content engine sender is active,

7   a) disregarding the negative acknowledgment message; and

8   b) if a second negative acknowledgment message is received, sending a

9   network alert; and

10   if the primary content engine sender is inactive, sending a multicast message to the

11   plurality of content engine receivers in response to the negative acknowledgment

12   message.

1   11. In a computerized device storing distributed content in a content distributed network,

2   a method for maintaining content comprising the steps of:

3   scanning the distributed content stored on the computerized device;

4   if missing files are discovered in the scanning step, sending a negative

5   acknowledgment message to a primary content sender requesting the missing files; and

6   if a response to the negative acknowledgment is not received from the primary content

7   sender, sending the negative acknowledgment message to a secondary content sender

8   thereby triggering a backup system.

1   12. A content engine sender, comprising:

2   means for sending a multicast message to a plurality of content engine receivers,

3   the multicast message including content to be distributed among the plurality of content

4   engine receivers;

5   means for waiting a predetermined period for a negative acknowledgment

6   message from at least one of the plurality of content engine receivers; and

7   means for if a negative acknowledgment message from at least one of the

8   plurality of content engine receivers is received before expiration of a predetermined

9   period, then resending the multicast message a predetermined number of times.

1   13. A computer program product having a computer-readable medium including

2   computer program logic encoded thereon that, when performed on a computer system

3   directs the computer system to perform the method of:

4   sending a multicast message to a plurality of content engine receivers, the

5   multicast message including content to be distributed among the plurality of content

6   engine receivers;

7   waiting a predetermined period for a negative acknowledgment message from at

8   least one of the plurality of content engine receivers; and

9   if a negative acknowledgment message from at least one of the plurality of

10   content engine receivers is received before expiration of a predetermined period, then

11   resending the multicast message a predetermined number of times.

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1   14. A computerized device for distributing content in a content distribution network

2   comprising:

3   a processor;

4   a memory;

5   a network interface;

6   an connection circuitry coupling the processor, the memory and the network

7   interface;

8   wherein the memory is encoded with logic that when executed by the processor as

9   a process, causes the computerized device to perform the operations of:

10   sending a multicast message, via the network interface, to a plurality of content

11   engine receivers, the multicast message including content to be distributed among the

12   plurality of content engine receivers;

13   waiting a predetermined period for a negative acknowledgment message, received

14   on the network interface from at least one of the plurality of content engine receivers; and

15   if a negative acknowledgment message from at least one of the plurality of

16   content engine receivers is received before expiration of a predetermined period, then

17   resending the multicast message a predetermined number of times via the network

18   interface.

1   15. The computerized device of claim 14 wherein the logic further causes the

2   computerized device to perform the operations of:

3   receiving a second negative acknowledgment message from one of the plurality of

4   content engine receivers after resending the multicast message the predetermined

5   number of times; and

6   sending a unicast message of content to be distributed in response to the second

7   negative acknowledgment message to the one content engine receiver.

1   16. The computerized device of claim 14 wherein the logic further causes the

2   computerized device to perform the operations of::

3   receiving a negative acknowledgment message from one of the plurality of content

4   engine receivers after the predetermined period has expired; and

5   sending a unicast message of content to be distributed to the one content engine

6   receiver in response to the negative acknowledgment message received after the

7   predetermined period has expired.

1   17. The computerized device of claim 14 wherein when the logic causes the

2   computerized device to perform the operation of sending, the logic causes the

3   computerized device to perform the operation of sending the multicast message in

4   response to a negative acknowledgment message from at least one of the plurality of

5   content engine receivers.

1   18. The computerized device of claim 17 wherein when the logic causes the

2   computerized device to perform the operation of sending, the logic causes the

3   computerized device to perform the operations of:

4   contacting a primary content engine sender before sending the multicast message;

5   sending the multicast message to the plurality of content engine receivers if the

6   primary content engine does not respond to the contacting; and

7   disregarding the negative acknowledgment if the primary content engine does

8   respond to the contacting.

1   19. The computerized device of claim 1 wherein the negative acknowledgment includes

2   a request for at least one file not received in the multicast message, and wherein when the

3   logic causes the computerized device to perform the operation of resending, the logic

4   causes the computerized device to perform the operation of resending only the at least

5   one file requested in the negative acknowledgment.

1   20. The computerized device of claim 19 wherein a plurality of negative

2   acknowledgments are received during the predetermined period, each negative

3   acknowledgment including a request for at least one file not received in the multicast

4   message, and wherein when the logic causes the computerized device to perform the

5   operation of resending the multicast message, the logic causes the computerized device to

6   perform the operations of:

7   aggregating the files requested in the plurality of negative acknowledgments; and

8   resending the multicast message including the aggregated files.

1   21. The computerized device of claim 1 wherein the multicast message includes a

2   plurality of files, each file of the plurality having an associated count value, the

3   associated count value indicating the number of times the file has been transmitted by the

4 computerized device, and wherein the logic causes the computerized device to perform

5 the operation of incrementing the associated count value each time the computerized

6 device transmits a file.

1 22. The computerized device of claim 21 wherein the negative acknowledgment includes

2 a request for at least one file not received in the multicast message, and wherein when the

3 logic causes the computerized device to perform the operation of resending the multicast

4 message further, the logic causes the computerized device to perform the operation of

5 resending the at least one file until the associated count for the at least one file equals the

6 predetermined number.

1 23. A computerized device for distributing content in a content distribution network, the

2 computerized device comprising:

3   a processor;

4   a memory;

5   a network interface;

6   an connection circuitry coupling the processor, the memory and the network

7 interface;

8   wherein the memory is encoded with logic that when executed by the processor,

9 performs operations of:

10   receiving, via the network interface, a negative acknowledgment message from

11 one of a plurality of content engine receivers;

12   checking a primary content engine in the memory sender for status;

13   if the primary content engine sender is active,

14   a) disregarding the negative acknowledgment message received via the

15   network interface; and

16   b) if a second negative acknowledgment message is received via the

17   network interface, sending a network alert via the network interface; and

1   if the primary content engine sender is inactive, sending a multicast message via the

2   network interface to the plurality of content engine receivers in response to the negative

3   acknowledgment message.

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1   24. A computerized device storing distributed content in a content distributed network,

2   the computerized device comprising:

3   a processor;

4   a memory;

5   a storage area;

6   a network interface;

7   an connection circuitry coupling the processor, the memory and the network

8   interface and the storage area;

9   wherein the memory is encoded with logic for maintaining content in a storage

10   area, the logic, when executed by the processor, performs operations of:

11   scanning the distributed content stored on the computerized device in the storage area;

12   if missing files are discovered in the scanning operation, sending, via the network

13   interface, a negative acknowledgment message to a primary content sender requesting the

14   missing files; and

15   if a response to the negative acknowledgment is not received from the primary content

16   sender via the network interface, sending, via the network interface, the negative

17   acknowledgment message to a secondary content sender thereby triggering a backup

18   system.

1   25. A device for distributing content in a content distribution network,

2   comprising;

3   a memory;

4   a storage device to store a multicast period and a threshold number of multicast passes;

5   the storage device further to store content to be distributed in the content

6   distributed network; and

7   a controller in communication with the memory and the storage device, the controller

8   *acting with the memory to control the device, the controller configured to send*

9   *multicast message to a plurality of content engine receivers, the multicast message to*

10   *include at least a portion of the content, the controller further configured to wait the*

11   *multicast period for a negative acknowledgment message from at least one of the*

12   *plurality of content engine receivers, the controller further configured to resend the*

13   *multicast message the threshold number of multicast passes if a negative*

14   *acknowledgement message is received before expiration of the multicast period.*

1   26. The device of claim 25 wherein the controller is further configured to send a unicast

2   message in response to a second negative acknowledgment message received after

3   expiration of the multicast period.

1   27. The device of claim 25 wherein the controller is further configured to send a unicast

2   message in response to a second negative acknowledgment message received after

3   the multicast message is sent the threshold number of multicast passes.